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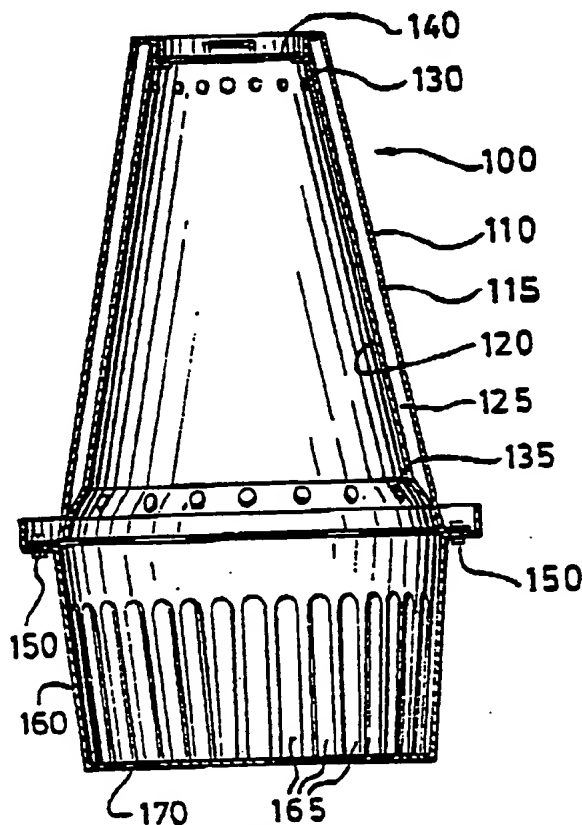
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁵ : B65F 1/14, C05F 17/02</p>	<p>A1</p>	<p>(11) International Publication Number: WO 90/06890 (43) International Publication Date: 28 June 1990 (28.06.90)</p>
<p>(21) International Application Number: PCT/GB89/01541 (22) International Filing Date: 15 December 1989 (15.12.89) (30) Priority data: 285,016 16 December 1988 (16.12.88) US (71) Applicants: GREEN CONE INC. [CA/CA]; 6725 Airport Road, Suite 502, Mississauga, Ontario L4V 1V2 (CA). HIRONS, Robert, Gordon [GB/CA]; 12 Monteith Street, Toronto, Ontario M4Y 1K7 (CA). (72) Inventor: WARRINGTON, Jack, Edward ; 36 Alder Road, Toronto, Ontario M4B 2Y4 (CA). (74) Agents: SENIOR, Alan, Murray et al.; J.A. Kemp & Co, 14 South Square, Gray's Inn, London WC1R 5EU (GB).</p>		<p>(81) Designated States: AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH (European patent), CM (OAPI patent), DE (European patent), DK, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL (European patent), NO, RO, SD, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: CONTAINER FOR DISPOSING WASTE

(57) Abstract

A container (100) for disposing of waste is provided. The container comprises an upper portion (110) and a lower portion (160) which are removably engaged to define an enclosure for the waste. The lower portion (160) comprises a plurality of water permeable passages (165) formed therein. The upper portion (110) includes solar radiation collection means (115, 120, 125) for heating the enclosure. The container is suitably used to decompose biodegradable waste. Preferably, the container is used to decompose biodegradable waste. Preferably, the container is used to decompose daily household refuse.



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CONTAINER FOR DISPOSING WASTETECHNICAL FIELD

The present invention relates to a container for disposing of waste.

Suitable disposal of biodegradable waste is an increasing problem. In the past (and presently) it has been accepted practice to use landfill sites for dumping all non-toxic refuse, both biodegradable and non-biodegradable. Generally, such a procedure involves digging a large hole in the ground and subsequently filling the hole with garbage to create a mound. Over time, grass may be grown over the mound. Unfortunately, such landfill sites usually tend to be unsightly, malodorous and possibly damaging to the ground water systems of communities surrounding them.

It has also been thought to be possible to use landfilled areas as sites to develop ski hills (when the site is in the form of a mound), construct airport runways (when the site is level) and the like. Unfortunately, the biodegradable refuse decreases in volume as it decomposes. This usually leads to unwanted

irregularities in the site which render it relatively unusable with respect to further development.

Recently, many municipalities and communities have instituted recycling programs which depend on households to separate garbage into degradable and non-degradable portions. The degradable portion generally comprises leftover food, bones, fruit rinds and the like. The non-degradable portion generally comprises glass, aluminum cans, paper and the like. The non-biodegradable portion may be further separated and recycled as appropriate. Unfortunately, a disposal problem still exists for the degradable portion.

BACKGROUND ART

The use of bacterial activity to decompose biodegradable waste has been known for a number of years. Generally, the bacteria require a food source to decompose the biodegradable waste. Certain types of biodegradable waste inherently contain such food sources. Alternatively, it is sometimes necessary to add to the biodegradable waste a food source for the bacteria. Examples of suitable food sources include calcium nitrate and commercially available mixed fertilizers. As the biodegradable waste is decomposed

by bacterial activity, its temperature can rise to from about 30° to about 70°C.

U.S. Patent 2,535,627 relates to an activated composter which is an aerobic digester activated by the addition of a composition containing aerobic bacteria and a medium suitable for growth with nutrients to maintain the bacteria in live condition for at least a year. The composition taught by this patent is disclosed as being suitable for decomposition of leaves, straw, garbage, sewage, feathers and the like.

U.S. Patent 3,136,608 teaches an apparatus for the aerobic biological transformation of organic waste material. More specifically, the apparatus requires that the organic waste material be passed, by the action of gravity, through three separate compartments. The inclination of the bottom of the apparatus is critical to successfully converting the organic waste material into compost material.

U.S. Patent 4,105,412 relates to a portable compost container which includes a base section for receiving fertilizer sap from the decomposing materials. The base section supports a perforate inner cylindrical section into which the organic waste refuse is placed.

An outer cylindrical section is then placed over the perforate inner cylindrical section such that there is a space between the two sections. The whole container is covered by a lid.

U.S. Patent 4,221,571 teaches a solar heated anaerobic digester which is adapted to decompose organic material to produce methane gas and a liquid fertilizer. A solar blanket apparatus is constructed around the bottom portion of the digester, containing a slurry of the decomposable organic material. The patent appears to be concerned with the production of methane gas from organic material (e.g. cattle manure). The products of digestion are methane and a slurry product which is referred to as "liquid fertilizer". This apparatus appears to be deficient in that it requires large amounts of water (7% solids slurry) which remains at the end of the digestion.

U.S. Patent 4,352,888 teaches a container for holding organic matter during decomposition. The container comprises a number of rectangular integrated panels and is mounted to the ground by brackets which are buried below the ground. The container disclosed by this patent may be increased in size by connecting additional rectangular integrated panels. This

container appears to be deficient in that it comprises vents to allow oxygen to enter and gases to escape the container. The emission of gases from the container could attract animals. Whilst such animals may be unable to penetrate the container itself, it would still be possible for them to enter the container by burrowing underground to the open bottom of the container.

It would be desirable to have an apparatus which is useful in decomposing biodegradable organic waste at a relatively accelerated rate. It would also be desirable to utilize solar energy to provide heat to assist the acceleration in decomposition rate. Further, it would be desirable to have an apparatus which does not emit odours that might attract animals. It would also be desirable to have an apparatus which is relatively impervious to the burrowing activities of small animals such as rodents, skunks and the like. Preferably, such a device would be simple to construct, install and use.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome or at least reduce one or more of the above-mentioned disadvantages.

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Accordingly, the present invention provides a container for disposing of waste comprising separable upper and lower portions defining an enclosure for the waste,

(i) the lower portion having a plurality of water-permeable passages formed therein; and

(ii) the upper portion including solar radiation collection means for heating said enclosure.

As used herein the term "waste" refers to biodegradable organic waste.

Thus, the container of the present invention utilizes solar radiation collection techniques to accelerate the decomposition process by increasing the temperature of the container and its contents. Further, the container defines an enclosure which is relatively impervious to small animals. Moreover, attraction of small animals to the container can be substantially inhibited since the emission of odours from the inside of the container can be reduced.

BRIEF DESCRIPTION OF DRAWINGS

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a cross-section of an embodiment of the invention; and

Figure 2 is a cross-section of a another embodiment of the invention.

DESCRIPTION OF EMBODIMENTS OF THE INVENTION

Referring now to Figure 1, there is illustrated a container 100 for storing waste comprising an upper portion 110 and a lower portion 160 which are removably engaged by fastening means 150.

Upper portion 110 comprises a transparent outer wall 115 and an opaque inner wall 120 thereby defining a solar collection chamber 125. Inner wall 120 further comprises a first set of openings 130 which are disposed circumferentially about the top of inner wall 120 and a second set of openings 135 disposed circumferentially about the lower portion of inner wall 120. Upper portion 110 is provided with an air-impermeable door 140 which may be used to introduce

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waste into container 100. Upper portion 110 may be constructed of any suitable material which is stable to year-round weather conditions. Non-limiting examples of such a material include plastic and fiberglass. Preferably, outer wall 115 is constructed from a material which transmits light at wavelengths of radiation in the visible region and inner wall 120 is constructed from a material which absorbs light at wavelengths of radiation in the visible region.

Lower portion 160 comprises a plurality of elongated passages 165. Lower portion 160 further comprises a bottom portion 170 which may comprise water permeable passages such as wire mesh and serves to close off the container thereby inhibiting entrance of small animals into the container. Alternatively, the whole of lower portion 160 may be a wire mesh arrangement. Lower portion 160 may be constructed from any suitable material which is stable to "below-ground" conditions. Non-limiting examples of such a material include plastic, steel and fiberglass.

Container 100 is installed by digging a hole to effectively cover at least the entire area of lower portion 160. It is desirable to install container 100

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in an area which is subject to direct sunlight for at least a portion of the day.

In operation, lid 140 is temporarily removed to permit daily household waste to be placed in container 100. An activator, which serves to initiate and maintain the decomposition process, may be also added to container 100. The use of an activator is optional and depends on the composition of the waste which is added to container 100. During the day, direct sunlight strikes outer wall 115, thereby heating solar collection chamber 125. This results in an increase in the temperature of the air contained in solar collection chamber 125, which results in a decrease in the air density. The decreased air density serves to initiate circulation of air between the contents of container 100 and solar collection chamber 125 through openings 130 and 135.

Accordingly, as sunlight strikes container 100, the temperature of the container and its contents increases. The increased temperature of the contents serves to accelerate the decomposition process. The volume of the waste in the container decreases as the decomposition process proceeds. Accordingly, it is

possible to use container 100 to dispose of daily household waste.

It is essential, for the container to operate properly, that water be present. The exact amount of water required for proper operation is difficult to specify and depends on the water content of the waste. For example, if the waste comprises materials which are high in water content (e.g. oranges, tomatoes and the like), it is not usually necessary to add additional water. If, however, the waste material comprises large amounts of low water content materials (e.g. orange rinds, bones and the like), it is usually necessary to add additional water.

It has been discovered, surprisingly and unexpectedly, that the container of the present invention may operate as a two-way pump which can expel or take in moist air. Specifically, during daylight, as container 100 heats up, the air therein expands thereby forcing air out of container 100 through slots 165. At night, as container 100 cools, the air therein contracts and extracts moist air from the surrounding ground through slots 165.

Referring now to Figure 2, there is illustrated a container 200 for storing waste comprising

an upper portion 210 and a lower portion 260 which are removably engaged by fastening means 250.

Upper portion 210 comprises a conically shaped solar radiation collection portion 215, a funnel 225 and an air-impermeable door 230. Upper portion 210 further comprises a chopper 220 disposed at the junction of solar radiation collection portion 215 and funnel 225.

Lower portion 260 comprises a plurality of openings 265. Lower portion 260 further comprises a bottom portion 270 which may optionally comprise water permeable passages similar to openings 265. Bottom portion 270 serves to close off container 200 thereby inhibiting entrance of small animals into the container.

As illustrated, container 200 is installed in the ground in a hole which has effectively covered lower portion 260 and part of upper portion 210.

The operation of container 200 is very similar to that of container 100 illustrated in Figure 1. An additional feature of container 200 is the provision of funnel 225 which serves to provide a larger opening for adding waste to container 200. A further additional feature of container 200 is the provision of a waste

size reduction means 220 which serves to decrease the size of the waste as it enters container 200 and is exemplified by choppers, grinders and extruders. Size reduction of the waste may be suitably achieved by hand or electric operation of means 220. It has been found that a reduction in the size of the waste results in an accelerated rate of decomposition.

As illustrated, container 200, once installed, is relatively impervious to small animals. Thus, small rodents are unable to enter container 200 by burrowing underground. Moreover, animals such as dogs, raccoons and the like are unable to topple over container 200 after it is installed.

As waste is added to container 200, it forms a mound 280, the volume of which is reduced as the decomposition process proceeds. After an extended period of time it may be necessary to empty container 200. This may be suitably achieved by removing fastening means 250, subsequently removing upper portion 210 and emptying the degraded waste material from lower portion 260. Upper portion 210 may then be refastened to lower portion 260 thereby readying container 200 for further use.

It should be understood that while the container of the present invention is suitable for use with almost all biodegradable waste, it is most preferred to use the container with daily household waste. Accordingly, it is preferred to not use the container to store materials such as grass clippings, leaves and the like - such materials tend to occupy large volumes and are relatively slow to decompose. Thus, the container of the present invention is not intended to operate as a high volume "composter". Rather, the container of the present invention is most suitably used as a waste disposal unit for biodegradable waste which is separated from non-biodegradable waste during recycling programs.

CLAIMS

1. A container for disposing of waste comprising separable upper and lower portions defining an enclosure for said waste,

(i) said lower portion having a plurality of water permeable passages formed therein; and

(ii) said upper portion including solar radiation collection means for heating said enclosure.

2. The container defined in claim 1, wherein said passages are defined by circumferentially spaced holes.

3. The container defined in claim 1, wherein said passages are elongate.

4. The container defined in claim 1, wherein at least a portion of said lower portion comprises a wire mesh portion thereby forming said passages.

5. The container defined in claim 4, wherein said wire mesh portion is constructed of steel.

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6. The container defined in claim 1, 2 or 3, wherein said upper and/or lower portion is constructed of plastic.

7. The container defined in claim 1, 2 or 3, wherein said upper and/or lower portion is constructed of stainless steel.

8. The container defined in claim 1, 2 or 3, wherein said upper and/or lower portion is constructed of fiberglass.

9. The container defined in claim 1, wherein said upper portion is substantially conical in shape.

10. The container defined in claim 1, 2 or 3 wherein said solar radiation collection means comprises a single wall.

11. The container defined in claim 9, wherein said solar radiation collection means comprises an inner wall and an outer wall, said inner wall and said outer wall being in spaced relation thereby forming a solar collection chamber.

12. The container defined in claim 11, wherein said outer wall is transparent and said inner wall is opaque.

13. The container defined in claim 11 or 12, wherein said inner wall comprises means to permit air circulation to occur between said solar collection chamber and said enclosure.

14. The container defined in claim 13, wherein said means to permit air circulation comprises a set of openings,

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said openings being circumferentially spaced about said inner wall.

15. The container defined in claim 14, further including a second set of openings, said first and second set of openings being spaced apart along the longitudinal axis of said container.

16. The container defined in claim 1, 2 or 3, wherein said enclosure has a circular cross-section.

17. The container defined in claim 1, 2 or 3, wherein said upper portion further comprises means for introducing said waste into said enclosure.

18. The container defined in claim 1, 2 or 3, wherein said upper portion further comprises waste size reduction means.

19. The container defined in claim 18, wherein said waste size reduction means is a chopper.

20. The container defined in claim 18, wherein said waste size reduction means is a grinder.

21. The container defined in claim 18, wherein said waste size reduction means is an extruder.

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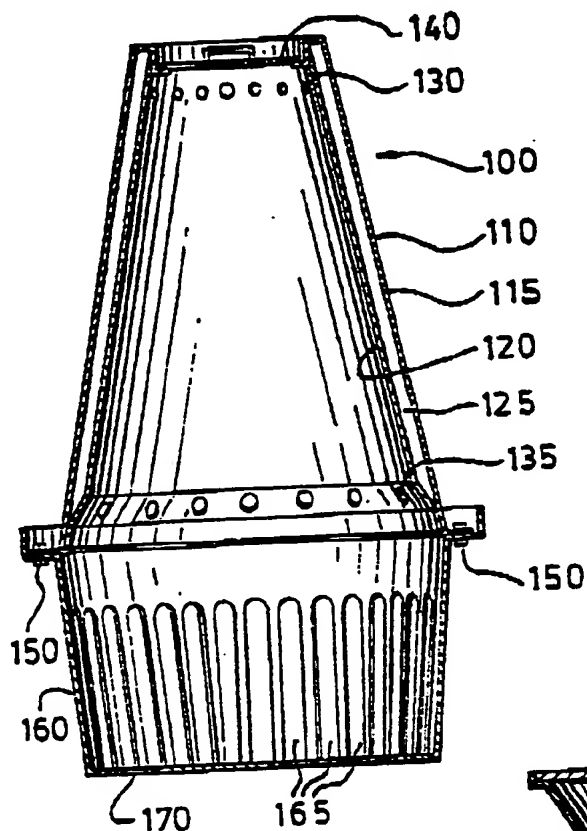


FIG. 1.

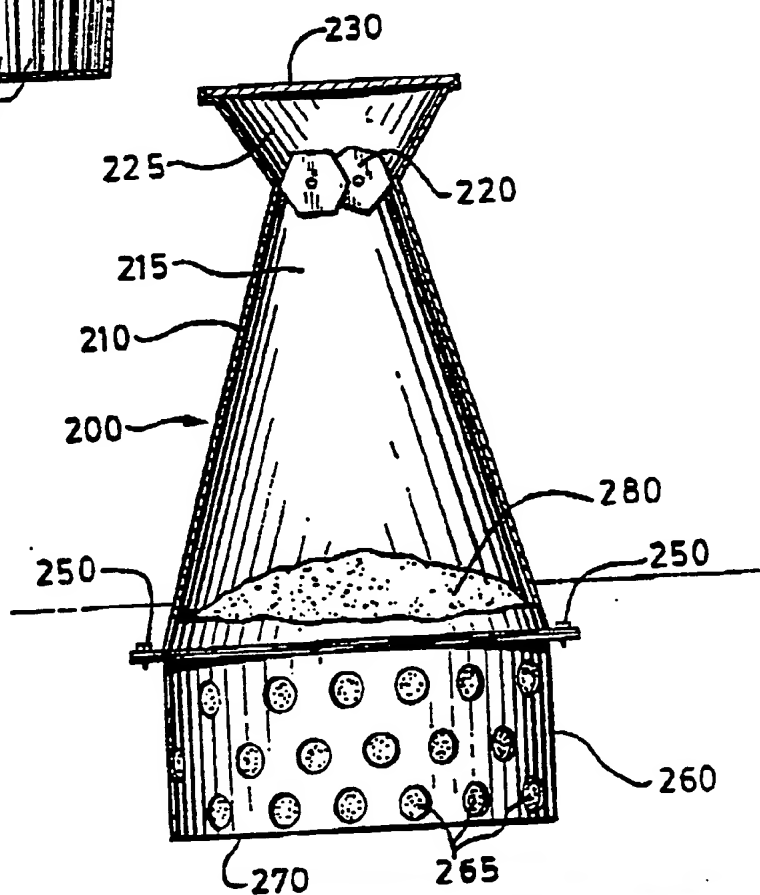


FIG. 2.

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 89/01541

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁸ According to International Patent Classification (IPC) or to both National Classification and IPC IPC ⁵ : B 65 F 1/14, C 05 F 17/02																							
II. FIELDS SEARCHED <div style="text-align: right; font-size: small;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%; border-bottom: 1px solid black; font-size: small;">Classification System</td> <td style="border-bottom: 1px solid black; font-size: small;">Classification Symbols</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">IPC⁵</td> <td style="border: 1px solid black; padding: 5px;">C 05 F, B 65 F</td> </tr> </table> <div style="text-align: center; font-size: x-small; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the extent that such documents are included in the fields searched ⁶</div>			Classification System	Classification Symbols	IPC ⁵	C 05 F, B 65 F																	
Classification System	Classification Symbols																						
IPC ⁵	C 05 F, B 65 F																						
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table style="width: 100%; border: none;"> <tr> <th style="width: 10%; border-bottom: 1px solid black; font-size: x-small;">Category ¹⁰</th> <th style="width: 70%; border-bottom: 1px solid black; font-size: x-small;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; border-bottom: 1px solid black; font-size: x-small;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 3708085 (O.C. BUMPAS) 2 January 1973 see figure 3; column 4, line 21 - column 5, line 43; column 8, lines 25-63</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,7,9,10, 16,17</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="text-align: center; vertical-align: top; padding: 5px;">--</td> <td style="text-align: center; vertical-align: top; padding: 5px;">6,7,18,19</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">DE, U, 8807910 (H.G. MEYER) 22 September 1988 see figure 1; claims</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,10,17</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 4105412 (M.W.A. PETZINGER) 8 August 1978 see claims; figures 1,3 cited in the application</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,2,10,11, 13-17</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">P,Y</td> <td style="padding: 5px;">DE, A, 3743651 (WOLF-GERÄTE GmbH) 6 July 1989 see claim 5; figure 1</td> <td style="text-align: center; vertical-align: top; padding: 5px;">18,19</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">DE, U 8530923 (H. HESS) 6 February 1986 ./.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">6,7,18</td> </tr> </table>			Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	US, A, 3708085 (O.C. BUMPAS) 2 January 1973 see figure 3; column 4, line 21 - column 5, line 43; column 8, lines 25-63	1,7,9,10, 16,17	Y	--	6,7,18,19	X	DE, U, 8807910 (H.G. MEYER) 22 September 1988 see figure 1; claims	1,10,17	X	US, A, 4105412 (M.W.A. PETZINGER) 8 August 1978 see claims; figures 1,3 cited in the application	1,2,10,11, 13-17	P,Y	DE, A, 3743651 (WOLF-GERÄTE GmbH) 6 July 1989 see claim 5; figure 1	18,19	Y	DE, U 8530923 (H. HESS) 6 February 1986 ./.	6,7,18
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<div style="display: flex; justify-content: space-between; font-size: x-small;"> <div style="width: 45%;"> <p>[*] Special categories of cited documents: ¹⁴</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"A" document member of the same patent family</p> </div> </div>																							
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; font-size: x-small;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black; font-size: x-small;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="text-align: center; padding: 5px;">26th April 1990</td> <td style="text-align: center; padding: 5px;">25.05.90</td> </tr> <tr> <td style="width: 50%; border-bottom: 1px solid black; font-size: x-small;">International Searching Authority</td> <td style="width: 50%; border-bottom: 1px solid black; font-size: x-small;">Signature of Authorized Officer</td> </tr> <tr> <td style="text-align: center; padding: 5px;">EUROPEAN PATENT OFFICE</td> <td style="text-align: center; padding: 5px;"> <div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">M. PEIS</div> M. Peis </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	26th April 1990	25.05.90	International Searching Authority	Signature of Authorized Officer	EUROPEAN PATENT OFFICE	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">M. PEIS</div> M. Peis													
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EUROPEAN PATENT OFFICE	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">M. PEIS</div> M. Peis																						

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	see page 3,4; figure 1; claims	12
A	DE, C, 3217725 (E. DÖRING) 21 April 1983 see claims	11

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 8901541
SA 33479

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 15/05/90. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3708085	02-01-73	None	
DE-U- 8807910	11-08-88	None	
US-A- 4105412	08-08-78	None	
DE-A- 3743651	06-07-89	None	
DE-U- 8530923	19-12-85	None	
DE-C- 3217725	21-04-83	EP-A,B 0094094	16-11-83

EPO FORM P0479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82